

IN THE SPECIFICATION

A marked-up copy of the changes to selected paragraph(s) is provided below. Please enter these changes to the specification in the record.

At paragraph 0029, please the following:

[0029] Zauderer suggested one possible explanation (Zauderer, NSF and Zauderer, "Analytical Investigation of Sulfur Capture and Slag rejection in Cyclone Coal Combustors", Final Report, U.S. DOE Contract No. DE-AC22-82PC50050, Jan. 17, 1983) for the rapid sulfur capture, namely, that it occurred primarily near the injection zone of the coal, limestone, and air into the combustor. Rapid volatilization of the coal particles releases the organic matter in the coal, including the sulfur, resulting in ignition and heatup under locally high excess air conditions. Consequently, the local gas temperature is lower than the final gas temperature of about 3000°F. However, the temperatures are high enough to rapidly heatup and calcine the limestone or lime, resulting in an internal porosity that is substantially greater than the values reported in the literature with slow calcinations. Furthermore, the heatup rates of the CaO particles lag that of the combustion gases, and it is the surface temperature of the CaO particles that control the reaction with SO₂. Therefore, the combination of a cooler initial combustion zone, a slower CaO heatup rate compared to the gas, and the greater particle porosity, all result in substantially greater sulfur capture than would be predicted by slower reactions under equilibrium gas and particle temperatures, as would exist in large boilers.

At paragraph 0044, please the following:

[0044] The chlorine in coal and in municipal solid waste results in the formation of dioxins and furan. However, the chlorine in coal is generally between 10 to 100 times lower in concentration than in municipal waste incinerators because the latter contains plastics that have substantially higher chlorine concentrations. The dioxins/furans are formed in the combustion zone at gas temperatures in the 2000 °F to 3000 °F range and separately in a narrow range in the post-combustion zone during regular gas cool down in the exhaust ducting below about 600 °F to 700 °F. Zauderer performed a series of tests in the 20 MMBtu/hour combustor-boiler in which coal was co-fired with various amounts (up to 50% of the total mass flow rate) of a shredded municipal refuse derived fuel (RDF) (B. Zauderer, et. al, "Tests on Co-Firing of Coal and Refuse Derived Fuel (RDF) in A Slagging Cycle Cyclone Combustor Attached to a Package Boiler", Coal Tech Corp., Merion, Pa. Report, Apr. 8, 1991, unpublished). The dioxins/furans were measured both

inside the boiler and in the stack exhaust, and subsequently analyzed by Rossi, et. al. using EPA Method 23 (L. Bonfanti, et. al., "PCDD/Formation and Destruction from Co-Firing and RDF in a Slagging Combustor", ENEL-Nuclear Research Center, Pisa, Italy, July 1992, Also in a paper presented at an International Environmental Conference, Lisbon, Portugal, 1992). The chlorine in the RDF was 10 times (0.5%) greater than that in the coal (<0.1%). With 40% RDF-60% Coal (mass flow) the dioxin and furans were about 60 times greater at the stack (almost 1,500 ng/NM₃) than with coal only.

At paragraph 0053, please the following:

[0053] A qualitative measure of the ratio of activated carbon to pollutant can be obtained from the mercury reduction tests that were also conducted in this Swiss incinerator. The mercury emissions also decreased with decreasing outlet duct gas temperature from 140°C to 110 °C. The injection of lime in the spray dryer also contributed to getting mercury. At 140 °F C, the Hg reduction across the spray dryer is 28%, while at 110 °C it was 43%. Injecting 30 mg/NM₃ at 110 °C, doubled the Hg reduction to 87%. In this case the carbon caused an incremental reduction of Hg of 105 µg/NM₃ from which a carbon to Hg weight ratio of only 285 is deduced.

At paragraph 0134, please the following:

[0134] Therefore, the invention shows that these techniques could be applied to very volatile mercury, which was not previously considered for this application. Due to the larger molecule, Hg will most likely diffuse slower than O₂ or S out of an ash droplet. Furthermore, the Hg bound to the organic coal matter that may well be released in combustion may be gettered by the porous internal structure of calcined limestone. For example, according to EPA mercury concentrations in U.S. coal are about 100 parts per billion (PPB). In contrast, the concentration of CaO injected in a 2% sulfur coal at a Ca/S mol ratio will be 1 million times that of Hg. The fact that Hg is a gas at the very high temperatures where this reaction takes place does not negate the feasibility of the proposed process because SO₂ is also a gas, and it was captured with CaO in the combustor. That such an effect was never observed before with limestone or lime injection in furnaces can be explained by the lack of a means for rapid removal of CaO with internal adsorbed Hg from the high temperature zone.